IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of: HOWLAND, Charles A. Group Art Unit: 1771

Serial No. 09/943,744 Examiner: PIERCE, Jeremy

Filed: 08-30-2001 Atty. Dkt. No: W0490/7028

For: FABRICS FORMED FROM INTIMATE BLENDS OF GREATER THAN ONE TYPE OF FIBER

To: Assistant Commissioner for Patents
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PATENT TRADEMARK OFFICE

CERTIFICATE OF FACSIMILE 37 CFR 1.8: I certify that this correspondence is being faxed to: Examiner Jeremy R. Pierce, at FAX #: 703-872-9310, TEL #: 703-605-4243 on the below date.

Date: 1/10/03 Sender's signature:

This statement is offered in support of the above application for patent.

RULE 132 STATEMENT OF CHARLES A. HOWLAND

(37 CFR 1.132)

My name is Charles A. Howland. My qualifications in the field of the invention are as follows. I hold a Bachelor of Science degree in Mechanical Engineering from Massachusetts Institute of Technology. My thesis work focused on extrusion methods for polymer processing. I have spent the last 20 years in industrial research focused on flexible composites and assembly. In addition to the last 11 years as Technical Director of Warwick Mills, I have worked in textile re-enforcement of tires, puncture resistant military tires and other advanced truck tire materials at Michelin Americas Research Corp and at assembly systems at Digital Equipment.

During the last 11 years my research group at Warwick has taken a leadership role in a range of difficult fibers based materials problems. These include the Vectran based crash bags for the Pathfinder, Mir and Beagle Mars missions for Jet Propulsion Lab. We have developed most

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of the Hull, Ballonet and heatseal tape materials for the current generation of Aerostat tethered blimps and the other military and commercial airships. We have patents pending in this field.

Here at Warwick Mills, we are leaders in the development of a new class of puncture resistant materials with applications in Tires, Gloves, Industrial Apparel, and Stab Resistant Vests. We hold pioneering patents in this art and continue to lead the industry in this materials class. We have developed and hold patents in the use of these materials in law enforcement and industrial gloves, and safety suits for protection from ultra high-pressure water.

Objectives of the Invention revisited:

Among the objectives of this and my related inventions are to provide soft, lightweight materials that deliver very high levels of puncture and cut resistance. This invention covers the dense constructions with the novel concept of multiple fiber types. These intimate blends deliver price performance not possible with single fiber type. These new fabrics have higher performance than filament variations and than the homogeneous staple fiber inventions.

Novelty:

The basis or novel aspects of the claimed invention is: The use of high cover fabrics where the weave density is adequate to prevent lateral shifting of the yarns, in combination with fine count intimate blends of high modulus and normal modulus fiber of the staple type. This is a significant development in the protective fabrics area of art. In this area the use of low-density wovens made of filament yarns or course count staple yarns are the current start of the art. These new fabrics are novel for their use of mixed fiber content in fine yarns.

Art used to support rejections:

The examiner has rejected some claims under 35USC103(a) "obviousness" as being unpatentable over Fels et al's '457 in view of Howland's '264, of which I am the inventor. Fels

should be withdrawn as a basis for rejection, because the nature of its construction and structure is incompatible with the high density weaves of the '264.

It is useful to note a point, which is understood by those skilled in the art. The weave densities and cover factors introduced in the Howland '264, the context in which the present claims are cast, are well recognized by those skilled in the art as a significant departure from the prior art of lower density weaving of protective fabrics; a new weaving range, structure, and complexity for which the limitations of many techniques common in lower density weaving simply make them irrelevant, without inventive effort.

Fels presents a spiral wound sheath over a core filament, composite yarn structure as a means for obscuring its high strength core filament of the yarn from exposure. Fels is clearly distinguishable from my invention of blended fibers, and is not a reasonable candidate for one of ordinary skill in the art for combination with Howland's '264. Fels core spun yarns will not survive the high weaving frictions involved in the constructions defined. These core spun yarns a just not suitable for warp in dense constructions. The angle of the wrapper yarns in core spinning makes them very susceptible to axial shifting in the fabric formation zone of the weaving machine. The use of core spun warp yarns in weaving of fine count dense constructions would require multiple new and novel techniques.

Fels deals with and is limited to a much different class of yarns; specifically composite yarns of different construction and greater weight range or denier, suitable only for relatively low density weave construction. Fels states expressly that the DREF2 (process range 18000-360 denier) process is only suitable for making coarser yarns, in deference to his preferred embodiment DREF3 (process range of 6000 to 300 denier) process. But even this process is likewise limited to making large diameter or heavier fibers and yarns, relative to the Howland '264 weave densities and cover factors. As Fels points out with all his examples the yarns he feels are of interest are much larger. In practice warp yarns for dense weaving are subject of severe stresses during weaving and if the yarn is fragile it must be two ply. If any core spun yarns were to be considered suitable for dense constructions it would have to be plied, as a two end

yarn or more likely as a three end corded yarn. This would put the lower limit ever for theoretical application at 720 and 600 denier for the core spun yarns.

It is known that core spun yarns become increasingly fragile as they become smaller. The number of fibers in the cover must fall as the total size of the yarn is reduced. As the cover is thinned out the wrapping fiber layer is easily damaged and dislodged. As a result even the low end of the DREF process window is total unsuited to the constructions and fabrics defined by the applicant. Yarns of this type have the wrong surface fiber angle and have the wrong denier range and have fragile wrapper structures any of which would render them unsuitable for use in the manner of my '264 constructions.

For example, Fels states at col.5, line 60 that "yarns with titer ranging from 200 to 4000 dtex are preferred." His claim 1 is even more restrictive, ranging from 600 to 4000 dtex. The meaning of Fels "dense fabric construction" in the context of his specification clearly is not the same as in the '264, 70 by 70 weaves and high cover factors. As would be expected by one of ordinary skill in the art, Fels' own examples support this limitation, citing thread counts of 6-12 per centimeter (18 - 31 ends per inch). The Fels sheath and core structure is in fact inoperative and unuseful at the scale of the '264 where the weave density has more than double the threadcount at 70 ends per inch and higher. There is no reason or motivation for one of ordinary skill to combine Fels with the '264. They are simply incompatible on their face.

Fels teaches the use of core spinning to cover the use of filament core yarns. The use of filament yarns defeats one of the key cost advantages of an all-staple fiber design as enabled by my invention. A key point is that core spinning is intended to make composite yarns of large size which have discrete core and cover domains. See diagram 1 of Fels.

Furthermore, the sheath fiber is wrapped over a core filament structure. The fibers of the core and fibers of the cover are very nearly <u>orthogonal</u> to each other. This structure by nature of its geometry maintains clear separation of the to fiber groups. The DREF process is not an intimate blending process. Intimate blending must be accomplished in the opening, carding and

sliver combining steps in cotton or worsted system spinning. In these steps the processing is seeking to create parallel and uniform distributions of all the fiber types in roving that will become the final yarn. Therefore Fels is incompatible and inconsistent with the intimate blend technique and structure I teach, where fibers of two types are "laid together" (page 10, line 21) substantially in parallel (Figs. 3A and 3B) within a single fiber bundle or within adjacent fiber bundles of a plied yarn (page 21, line 20), or within adjacent yarns.

We have also amended my independent claims to include the parallel orientation of the specified fibers as a limitation, making them very different from Fels wrapped core structure. This should reinforce my position that Fels should be withdrawn as a basis for rejection.

The Office rejects other claims under 35 U.S.C. 103(a) as being unpatentable over Opitz in view of Howland's '264. Opitz is similar to Fels wrapped sheath on core filament structure. Opitz's examples again teach very large yarns, in the order of 900 Denier. The sheath and core technology of Opitz is likewise fundamentally not operable and not useful in the '264 context. Opitz is no more useful than Fels in high density constructions, and offers no reason or expectation of success alone or in combination with Fels or Howland to one of ordinary skill in the art, as to accomplishing the same results as my invention. The amendments to my independent claims are equally applicable to distinguishing it from Opitz as from Fels. In my opinion, Opitz should be withdrawn for the same reasons as Fels.

The examiner also rejected some claims under 35USC103(a) as being unpatentable over Opitz or Fels in view of Howland and further in view of Toon's 548. My prior remarks with respect to the sheath and core structures of Fels and Opitz, are generally applicable to Toon, too. I don't understand how anyone skilled in the art could assert Toon to be useful in combination with the high density weaves of my '264. In my opinion, Toon should be withdrawn as inapplicable.

Finally, the office rejected some claims under 35 USC103(a) as unpatentable over Opitz or Fels in view of Howland and further in view of Prickett's '885. Prickett prefers yarns of 550

to 4700 dtex, offers examples at 4 end and 6 end weave densities, and would to one of ordinary skill in the art be likewise vastly unuseful in the context of my '264 weave densities and cover factors for achieving the same results. Prickett offers nothing to otherwise unify the unrelated art of Opitz or Fels to my '264. Prickett should be withdrawn also.

The undersigned declares further that all statements of his own knowledge made herein are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Respectfully submitted this 10TH JAN 2003

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